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Feature Article - Economic and Financial Monitoring

INTRODUCTION

A range of institutions is involved in economic and financial monitoring of national economies, but with different emphases. Commercial banks and funds managers, and the credit rating agencies on whose opinions they may draw, are concerned with the risk to which they are exposed in various markets. If they judge the risk of some form of financial crisis has risen significantly, they will wish to reduce their exposure accordingly. For the case of funds managers who mainly hold tradable securities, this can be done very quickly. On the other hand, advisers to policymakers will need a much earlier advance warning of emerging
economic and financial problems so that policy actions can be taken to avoid them (or at least reduce their severity).

This paper looks at what variables have been found useful in various studies for predicting financial crises. In particular it shows how data compiled by the Bank for International Settlements (BIS) can assist in this process. It concludes by drawing some implications for statistical agencies.

PREDICTING THE ASIAN FINANCIAL CRISIS

The recent Asian financial crisis demonstrates that economists have much to be modest about in their forecasting ability, as the following statements show;

"there are few signs of the tensions and imbalances that usually foreshadow significant downturns in the business cycle…. The prospects for newly industrialised economies in Asia remain bright" - International Monetary Fund (IMF) World Economic Outlook, May 1997 (pp1,10).

"growth in East Asia should remain robust …. fuelled by strong growth, rising OECD import demand in many non-OECD regions, especially Asia, should
remain an important source of demand growth for many OECD economies" - Organisation for Economic Co-operation and Development (OECD) Economic Outlook, June 1997 (pp xi,5).

This failure to foresee the looming Asian crisis was not, of course, restricted to these international agencies. The ratings agencies gave little or no warning either. Sovereign credit ratings had generally been going up prior to the crisis and were only cut in late 1997, a couple of months after the currencies had plunged. Nor were financial markets any wiser: spreads on emerging economy bonds narrowed between 1995 and mid 1997 (on some calculations by even more than the ratings upgrades would imply). The consensus of private sector forecasters back in June 1997 had been that Indonesia's GDP would grow by 7.6 per cent in
1998: it is now thought to have contracted by 16 per cent.

THE ECONOMETRIC LITERATURE ON PREDICTING CRISES

Economists have been working hard to improve this performance. The econometric literature on predicting financial crises has grown exponentially in the 1990s. The best summary of this literature prior to the Asian crisis is in the paper by Graciela Kaminsky, Saul Lizondo and Carmen Reinhart <footnote 2>. They review 28 studies of currency crises, which between them tested 105 possible indicators, of which 43 are significant in at least one study. Those variables that have most often been statistically significant are international reserves, the real exchange rate, credit growth, inflation and real GDP (either growth or relative to trend). Surprisingly, the current account was generally insignificant in these tests, despite its prominence in discussions of crises. This may reflect the differing implications of current account deficits arising due to higher consumption and those arising from increased high-quality investment, or those funded by direct investment and those funded from portfolio flows, which tend to be shorter-term and more volatile. The size and composition of external debt was also rarely found to be a useful indicator in these studies, although it seems to have been very important in the very recent Asian crises.

The Asian crisis provided a further stimulus to these studies. The IMF provides the most recent overview. After making suitable caveats, they offer "some tentative conclusions" based on their reading of the literature:

"Currency crises tend to be preceded by an overvaluation of the real exchange rate, rapid domestic credit growth, expansion of credit to the public sector, a rise in the ratio of broad money to foreign exchange reserves, an increase in the domestic inflation rate, a decline in FDI flows, and an increase in industrial country interest rates. Other factors that receive some, though less, support as leading indicators of currency crises are a widening of the trade deficit, an increase in the fiscal deficit, a deterioration in export performance, and a slowdown in real GDP growth. It is noteworthy that current account and fiscal deficits do not seem to garner a lot of support as important indicators."<Footnote 3>

This provides some guidance to which variables economists might want statisticians to concentrate their efforts. They are mostly conceptually straightforward. (The exception is overvaluation of the real exchange rate. Is this a bilateral or an effective rate? Should it be based on consumer prices, producer prices or producer costs? Should overvaluation be measured relative to some average period and if so how should the base be chosen? What trend is there in an equilibrium real exchange rate and how does it respond to developments in the real economy?)

There has also been comparable econometric work on banking crises. For example, Demirgüc-Kunt, and Detragiache (1998) conclude that banking crises "tend to erupt when the macroeconomic environment is weak, particularly when growth is low and inflation is high. Also, high real interest rates are clearly associated with systemic banking sector problems" <Footnote4>. Hardy and Pazarbasioglu (1998) add to this list of potential causal factors credit expansion, capital inflow, sharp declines in the real exchange rate and adverse trade shocks. They comment that banks' foreign borrowing was a particularly significant factor in the Asian crisis <Footnote5>. In an overview of this literature, the IMF comment;

"With regard to banking crises, these are often preceded by large inflows of short-term capital, rapid expansion of domestic credit … slackening of real activity, and declines in the stock market and prices of other assets. Case studies suggest that, in many instances, liberalisation without adequate strengthening of the regulatory regime not only sets the stage for a banking crisis but also makes it more difficult to cope with a crisis if it erupts."

The two strands are related as many analyses have concluded that currency crises may lead to

banking crises (and vice versa).

These econometric exercises continue to be refined, both by better procedures and by gathering more and improved data. Leading indicator models are in their infancy and much more work is being done. Many of the current models only distinguish between a crisis and no crisis, rather than degrees of severity of financial problems. Possible directions for improving data would include making more use of aggregate international banking data. Some approximate quantification could be attempted for potentially relevant influences such as central bank independence, political stability and the quality of supervision. Some
would argue for greater attention to political variables. <Footnote6>If information about the activities of large investors could be compiled, this would make a useful addition. The role of contagion could be investigated further. A financial crisis occurring elsewhere, particularly in a large or nearby country, has been found to raise the probability of a crisis in the domestic economy <Footnote7> but opinions differ about the mechanism. It may operate through trade or credit links or it may arise because (perceived) macroeconomic similarities alarm foreign investors or because large institutional investors lump all emerging markets (in a region) together. These channels have different implications for the best way of constructing a contagion variable.

As well as econometric work, there has been a large array of other studies looking at the Asian crisis and highlighting the role of different economic factors. <Footnote8>

IMPLICATIONS FOR MONITORING

To the extent some consensus emerges from these studies as to the most important indicators of future financial distress, this can inform the choice of variables to be considered in monitoring exercises and the relative attention paid to them. This in turn will have implications for where policy advisers in this area would want statistical bureaux to direct scarce resources. However, the limitations of this process need to be borne in mind. The Economist's summary of a recent study is instructive;

"[The authors look] at three models created by academic economists before the Asian crisis and ask whether they would have helped to predict it. The answer is: not really. They argue that two of the studies … would have been of 'little use' in predicting Asia's crash. The third study … would have proved a better predictor than pure guesswork, but not much. It would have issued far stronger warnings for Brazil and the Philippines (which did not have currency crashes) than for Thailand or South Korea (which did)." <Footnote9>

A comparable study of out-of-sample forecasting of banking crises reaches similar conclusions. <Footnote10>

These 'failures' are not really surprising. There are always going to be idiosyncratic features to financial crises. For example, the Mexican crisis reflected mainly weaknesses in the public sector while the Asian crisis was more related to private sector weaknesses. Another problem for the econometricians is that, if the authorities react to a warning signal effectively, there will not be a crisis and so the econometric tests will conclude the warning signal is not a 'significant' predictor.

Another obvious limitation of these studies for the discussion here is that it only tests the usefulness of data that was available. It says nothing about what other information that could have been compiled might have been useful. It also says nothing about what data would have been useful if its quality had been better. Two examples stand out of the latter. Had some central banks released more comprehensive data on international reserves, incorporating forward positions, the extent of weaknesses would have been evident earlier. The average capital ratio of banks is a potentially useful indicator but only if the data on capital is

based on a realistic assessment of non-performing loans and appropriate provisioning for them.

THE BIS INTERNATIONAL BANKING STATISTICS

An important element in the Asian crisis was the magnitude of external debt of these economies. Unlike some earlier crises elsewhere, in the Asian case most of this debt was not owed to international agencies or borrowed by governments. Most of it was private sector debt borrowed from commercial banks or raised on financial markets. While the World Bank publish detailed data on total external debt in Global Development Finance (formerly World Debt Tables), it is not very timely and concentrates on finance provided by the public sector. At July 1997 (i.e. at the beginning of the Asian crisis), the most recent data referred to end-1995. It also only covers debt of 'less developed' countries, a category from which some Asian economies have recently graduated. More timely, if a little less comprehensive, data is available from three BIS publications. The quarterly data also has the advantage of covering all economies (advanced and developing) in a uniform manner. At July 1997, the latest data from these publications referred to end-1996.

- International Banking and Financial Market Developments is published quarterly and contains data on lending by 'BIS reporting banks' (essentially banks in advanced economies) and international debt securities issued by various countries. It also includes some sectoral and currency breakdowns.
- The Maturity, Sectoral and Nationality Distribution of International Bank Lending is published half-yearly. It provides a breakdown of bank loans by maturity and by nationality of lender.
- Statistics on External Indebtedness is published half-yearly in conjunction with the OECD. It adds the BIS data on external claims of banks to officially guaranteed or insured trade-related claims of banks or non-banks in 20 OECD countries. It therefore covers a very substantial proportion of gross external debt.

All three publications are available on the BIS website at www.bis.org.

The BIS is currently working to improve these collections. The aim is to:

- Increase frequency and shorten publication lags, without unduly raising respondent burden;
- Provide full coverage of borrower countries (i.e.. including advanced economies);
- Provide data on ultimate risk (i.e.. final borrower) basis; and
- Increase the number of reporting countries.

Table 1 shows the raw data on BIS reporting banks' external assets pertaining to the Asian emerging economies at end-1994 and end-1996, taken from the May 1997 issue of the quarterly publication. Even a cursory glance at this data, publicly available before the Asian crisis, shows the five Asian countries whose currencies were to be most affected had large debts. Furthermore, these debts were growing very rapidly, even for such fast-growing economies. Yet at the time, this attracted relatively little attention.

A closer look at the data reveals some other interesting aspects. A comparison of the reporting banks' assets and liabilities shows that while Indonesia and South Korea had relatively small amounts placed with the banks relative to what was owed to them, Taiwan was actually a net lender to them.

Table 1: Reporting Banks' External Assets vis-à-vis Individual Asian Economies
($US billion)

	Dec 1994	Dec 1996
Indonesia	42	57
South Korea	61	108
Malaysia	14	26
Philippines	7	13
Thailand	54	99
China	56	80
Taiwan	22	23
India	15	19

Source: BIS International Banking and Financial Market Developments, May 1997, table 5A.

The maturity and sectoral structure of 'foreign' claims <Footnote11> is shown in Table 2. Indonesia, South Korea and Thailand had very large amounts of debt falling due within a year. In South Korea the banks primarily incurred the debt whereas in Indonesia it was mainly incurred directly by the non-bank private sector.

Table 2: Maturity and Sectoral Break-down of Foreign Claims
($US billion)

	Up to one year	1-2 years	Over 2 years	Banks	Public sector	Non-bank private sector
Indonesia	34	4	15	12	7	37
South Korea	68	4	16	66	6	28
Malaysia	11	1	7	7	2	14
Philippines	8	1	4	5	3	5
Thailand	46	5	16	26	2	42
China	27	4	20	23	8	24
Taiwan	19	0	3	13	0	9
India	7	1	7	4	3	10

Source: BIS The Maturity, Sectoral and Nationality Distribution of International Bank Lending: Second half 1996. July 1997, page 5.

Scaling this data is more useful for comparative monitoring exercises. The size of the economy is one obvious comparator. To avoid movements in this ratio being dominated by short-lived swings in exchange rates it is useful to translate national GDP into US dollars using some smoothed exchange rate. Table 3 uses the 'World Bank Atlas method'. <Footnote12>

Another potentially useful measure is to compare the gross amounts owed to the international banking system with the country's international reserves.

A third measure is to express the amount of funds borrowed by domestic banks from the international banking system relative to its lending to the private sector. This is an (admittedly highly imperfect) proxy for the extent to which local bank lending is denominated in foreign currency. Such lending leaves borrowers exposed to significant exchange rate risks. This may in turn generate significant credit risks for the banks concerned.

Values for these three indicators as at end-1996 are shown in Table 3. This is the data that was available just before the Asian crisis erupted. It shows there were already warning signs evident. Thailand's borrowings from international banks were very large relative to its GDP, both in comparison with advanced economies and other emerging economies.

Malaysia, Indonesia and South Korea were also large borrowers. (Hong Kong and Singapore are special cases. As international financial centres they will have both large borrowings and lending to international banks.) South Korea, Indonesia and Thailand had the lowest reserves relative to their international borrowing among the Asian economies in Table 3. (Thailand and South Korea

would have looked even more vulnerable in these comparisons if commitments in forward markets or loans to commercial banks were netted off the gross reserves used in this ratio.) The final column suggests Thai companies may have been carrying the most foreign exchange risk.

Overall, an analysis along the lines of Table 3 would have performed quite well in warning of which Asian economies were most vulnerable to a crisis.

Another important aspect of vulnerability is debt servicing requirements. This is not included in the BIS data but assuming an interest rate and using the maturity information in the BIS data could form the basis for an estimate.

Table 3: Indicators Based on BIS International Banking Data - end 1996

	Liabilities to BIS reporting banks: % to GNP	Gross international reserves: % to liabilities to BIS reporting banks	Banks' liabilities to BIS reporting banks: %to domestic claims on private sector
China	9	140	8
India	5	130	10
Indonesia	26	34	18
South Korea	22	31	28
Malaysia	29	108	21
Philippines	16	88	23
Taiwan	8	411	6
Thailand	56	39	46
Australia	15	32	11
Germany	22	23	13
Japan	18	24	12
Unites States	16	13	13
Argentina	13	52	23
Brazil	12	72	20
Mexico	22	26	34
Poland	6	248	11

Sources: BIS International Banking and Financial Market Developments May 1997 (tables 5A and 5B); World Bank World Development Indicators 1998 (tables 1.1 and 4.16); IMF International Financial Statistics October 1998 (country tables lines ae and 32d).

CONCLUSIONS: MESSAGE FOR STATISTICIANS

The implications that might be drawn for the work of national statistical agencies and statisticians within central banks from the above discussion could be:

- Keep producing the key macroeconomic data such as GDP and inflation.
- Improve disclosure of international reserves data, both in terms of timeliness and more crucially, include forward transactions etc.
- Improve balance of payments data relating to capital flows, especially short-term portfolio flows, given their increasing scope to either destabilise or discipline (depending on your viewpoint) the domestic economy.
- Improve quality and international consistency of banking data (e.g. treatment of non-performing loans).
- Improve data on borrowing (distinguishing between domestic currency and foreign currency) by companies.
- Help the BIS improve the international banking statistics (as discussed above).

FOOTNOTES

1. "Leading Indicators of Currency Crises". This paper first appeared as an IMF working paper in July 1997. A later version appears in the IMF Staff Papers, March 1998. <back>

2. IMF International Capital Markets (September 1998) p174.<back>

3. "The Determinants of Banking Crises in Developing and Developed Countries", IMF Staff Papers, March 1998.<back>

4. Hardy, D. and Pazarbasiogulu, C. "Leading Indicators of Banking Crises - Was Asia Different?", IMF working paper 98/91 (August 1998).<back>

5. The Economist Intelligence Unit accords political factors a 40% weighting in its credit rating processes. On the other hand, political factors were argued to add little information in tests by Haque, N., Nelson, M. and Mathieson, D. "The Relative Importance of Political and Economic Variables in Creditworthiness Ratings", IMF working paper 98/46 (April 1998).<back>

6. Examples include Eichengreen, B., Rose, A. and Wyplosz, C. "Contagious Currency Crises", NBER working paper 5681 (July 1996) for advanced economies, and Frankel, J. and Rose, A. "Currency Crashes in Emerging Markets: an Empirical Treatment", Journal of International Economics (November 1996).<back>

7. The literature divides between those who see the Asian economies being punished for fundamental weaknesses such as 'crony capitalism', lax supervision or excessive foreign debt and those who see them as innocent victims of a herd mentality among international investors. There is a similar divide between those who see the IMF's role as helpful and those who see it as harmful. Radelet, S. and Sachs, J. "The East Asian Financial Crisis: Diagnosis, Remedies, Prospects", Brookings Papers on Economic Activity (March 1998) is a good example of the latter and the IMF's analysis on their web-site www.imf.org a good example of the former. Most of the literature falls between these extremes. An example is Goldstein, M. and Hawkins, J. "The Origin of the Asian Financial
Turmoil", Reserve Bank of Australia research discussion paper 9805 (May 1998). Many of the papers on the Asian crisis are gathered at www.stern.nyu.edu/~NRoubini/Asia/ AsiaHomepage.html.<back>

8. "The Perils of Prediction", The Economist 1 August 1998, citing Berg, A. and Pattillo, C. "Are Currency Crises Predictable? A Test", IMF working paper (forthcoming).<back>

9. Demirgüc-Kunt, A. and Detragiache, E. "Monitoring Banking Sector Fragility: A Multivariate Logit Approach with an Application to the 1996-97 Banking Crises", IMF working paper (forthcoming), cited in IMF International Capital Markets (September 1998) p174.<back>

10. Defined as consolidated cross-border claims in all currencies and local claims in non-local currencies.<back>

11. The average of a country's exchange rate for that year and its exchange rates for the two preceding years, after adjusting for differences between the rate of inflation (using GNP deflators) in the country and the G-5 countries, weighted as in calculating the SDR.<back>

Asian Countries in Crisis, Manila, 1-2 October 1998.